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Challenges and Benefits when Using Biology Practical Work in Gucha South Sub County, Kisii County, Kenya: Teachers' Perspective

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Abstract: *Use of practical work greatly contributes to successful classroom pedagogy. Various challenges may however, hinder effective use of practical in biology instruction. Despite the challenges, there too are several benefits that accrue when biology is taught through practical activities. The purpose of this study was to find out the challenges and benefits when practical work is used during biology instruction. The study was guided by the following two objectives: To determine challenges faced by teachers when using biology practical work and two, to analyze the benefits when using practical work during biology instruction. Constructivism theory by Jerome Bruner guided the study. Saturated sampling technique was used to select all the 42 biology teachers. Data was collected by use of three instruments: Biology Teachers' Questionnaire (BTQ), Document Analysis Guide (DAG) and the Biology Teachers' Interview Schedule (BTIS). Quantitative and qualitative data analysis techniques were used. Quantitative data was analyzed by use of percentages while qualitative data was analyzed thematically. The challenges revealed include: inadequate resources and facilities, teachers' inexperience, health and safety risks, lack of technical assistance and imbalanced format of examination. The study also revealed the benefits of biology practical work as: promote understanding of biological concepts, develops important skills, leads to understanding of the process of science, promotes creativity and finally encourages development of group attributes such as cooperation. The findings may be important to inform the education stakeholders and curriculum developers the challenges and benefits that are associated with biology practical work and how to mitigate these challenges.*

Keywords*: Benefits, Biology practical work, Challenges, Instruction, Practical activity*

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1. Introduction

Practical work is conducted through various practical activities. Practical activities have for a long time been recommended for use in biology teaching. These activities involve the learner wholly when well planned. Daba, Anbassa, Oda and Degefa, (2016) are of the view that learners tend to be more successful when they practice the subject matter through practical activities. The Trends in International Mathematics and Science Study (TIMSS) 2007 study (Sturman, Ruddock, Burge, Styles, Lin, & Vappula, 2008) found out from a study in England that, 13 to 14-year old learners are most likely to utilize more of their lesson time undertaking science practical activities unlike learners in other international countries. Given that a large proportion of time in science lessons is expected to be spent on practical work in England, it is important to be able to justify that amount of time by understanding the challenges and benefits of the methodology. Furthermore, science teachers in England often use hands on teaching approaches during classroom instruction.

Biology is fundamentally one of the science subjects implied in this case. Conducting an observation of the surrounding and practical activities both outside and inside the classroom are necessary so as to have an understanding of the nature of science and also to motivate the learners. Moreover, Chala, (2019) posits that in countries like Greece and Ireland biology teachers occasionally use practical work, as a result of insufficient resources. However, it has been observed that even when the resources are sufficient like in Germany, the routine seems to be more teacher-led practical work than any other approach. Such teacher-led practical activities limit the interaction of learners with instructional resources. In Nigeria the objectives of studying biology in secondary schools revolves around hands-on activities and active learning (WAEC, 2014). Ackon (2014) from a study conducted in Ghana identified challenges including: time, attitude of the learner, resources and material as contributing to the minimum use of practical work in biology.

According Sharpe (2012) practical work refers to any teaching or learning activity which at some point involve the students in observing and manipulating the objects and materials they are studying. Many school science practical tasks, however, do not have this form. It is worth noting that not all practicals require to be conducted in the laboratory. Therefore, the implication is that the absence of a laboratory should not totally deter use of biology practical approach. Many countries have given attention to the effective implementation and practice of science education at their secondary schools (Beyessa, 2014). China and India are the two outstanding countries strengthening their science curriculum standards to become economic and industrial powerhouses and in several ways compete effectively with developed countries (Daba et al., 2016). Chala (2019) observes that, many research findings in various countries continue to show that practical work is either totally not done or poorly implemented in secondary schools in these countries. The minimum use of these practical work in teaching biology might be due to the challenges teachers face in implementation. Daba, and Anbesaw (2016) from another study in Ethiopia found out that the key challenges to biology practical work were: absence of separate biology laboratory, teachers not embracing improvisation and local government lack of paying attention to school challenges.

Adherence to educational aims, develops teachers' abilities to assess the way they teach biology through practical activities at all education levels. This in turn increases the teachers' confidence and their ability to practice the methodology (Sharpe, 2012). Okoli and Egbunonu (2010) describes the practical teaching approach as one that engages learners in active learning process by enabling manipulation of available resources and equipment. Biology practical is the scientific study of the life and structure of plants and animals and their relative environment in real or experimental set up. According to Owiti (2015), the defining feature of school science is 'the practical', its characteristics have changed substantially during the lifetimes of many science teachers. Of importance is that most learners come to the biology classroom with some significant prior knowledge of the subject as a background. Therefore, under no circumstance should learners ever be considered as 'blank slates', beginning without any scientific knowledge, just waiting to receive the concepts, principles and skills (Owiti, 2015).

From the study by Ongowo and Indoshi (2013) it can be observed that practical activities are fundamental for improved learner performance in biology examinations. This standpoint is supported by Imanda, Omwenga, Andima and Obuba (2020) who posit that practical activities are necessary ingredients for active learning whereby learners are engaged through process skills. They further posit that; teachers have outcried a number of reasons that limit their use of hands-on instructional approaches in biology. With these reasons in mind yet, emphasis has been that the biology teacher should as much as possible be innovative (Ameka and Nyakwara, 2020). However, this is not always the case.

Theoretical Framework

This study was guided by the Constructivist theory as proposed by Jerome Bruner (Bruner 1966). Constructivism theory is founded on scientific observation which are expected to emanate from the practical learning that takes place in science environment. Through their own constructive learning engagements, persons impose order and predictability on biology phenomena and objects of the surrounding (Ajaja, 2013). The experiences of the learners need to be well mediated by material and guided by the teacher. Any hindrance towards this goal, for instance, the challenges experienced when using practical work, ultimately limit the achievement of the set and expected objectives from being achieved.

Statement of the Problem

From the foregoing background, it is evident that practical work is vital for effective biology instruction. Studies carried out in England, Greece, Nigeria, Ghana, Ethiopia, Kenya among other countries show that there are challenges that hinder effective biology practical work. There are similarities and also some variations in the challenges identified by various scholars in these countries (Ackon, 2014). The present study sought to find out whether similar challenges were being experienced by the biology teachers in Gucha south sub-county, Kisii County, Kenya. Practical work is highly recommended in the teaching of science subjects and hence biology. However, in the course of its use, teachers face a number of challenges. Such challenges once identified will enable

appropriate mitigation measures to be arrived at. Despite the challenges, a number of benefits equally accrue from use of practical work during biology instruction, which have been misconceived. It was therefore necessary to a survey conducted to determine these misconceived benefits and challenges when using the practical work during biology classroom instruction.

Objectives of the Study

The study was guided by the following two specific objectives: To determine challenges faced by teachers when using biology practical work and two, to analyze the benefits when using practical work during biology instruction.

2. Literature Review

Relevant literature has been reviewed in two key thematic areas as per the research objectives. These are: Challenges in the use of practical work in biology instruction and secondly, benefits of using practical work in biology teaching and learning.

2.1 Challenges in the Use of Practical Work in Biology Instruction

Daba, et al. (2016) found out that the biology teachers under study in Ethiopia were not using laboratory practical method. The reasons for their failure to use the method among others were the lack of equipment, absence of laboratories, and absence of a separate biology laboratory. Ultimately this failure to use the recommended methods ended up impacting negatively on the learner attainment, interest and attitude towards biology. From a similar viewpoint, Tiberghien, (2000) proposes and discusses a range of alternatives to practical work, including inquiry approaches, and more learner-learner interaction. Despite these controversies, many other studies continue to reiterate the position held by biology practical work. These practical activities are therefore not devoid of challenges (Ngesu, Gunga, Wachira, & Kaluku, 2014). Ameka and Nyakwara (2020) from their study reiterates challenges faced in practical biology teaching, however, their study focused on school administrative challenges. The present study however, focused on teacher-identified challenges.

Folorunso and Nwosu (2006) posits that engagement of learners when planning and executing improvisation of instructional material is an important aspect in biology instruction. Students should be involved in improvisation of science materials. The involvement of learners in this vital process tends to explore and expose them to specific knowledge and skills needed in the active learning process. The outcomes that teachers perceive have often been found to be different from those identified by the learners. Studies on practical work in secondary schools in Ethiopia have been conducted to identify factors hindering its proper implementation (Chala, 2019). Studies conducted in Ethiopia have shown that secondary students are never exposed to the practical experiences specified in the prescribed science curriculum. This is attributed to the teething challenges that limit this important undertaking. With any biology practical activity, making learners aware of its purpose and learning objectives can increase its effectiveness as a learning experience and enable the students benefit more from it. If the goals and objectives are not expressed in terms of being able to apply scientific knowledge, concepts and skills there is likely to be a danger of students simply following procedures when conducting practicals. Properly planned biology practicals however, have been found to stimulate learners and engage them so as to learn at different levels. By so doing, the activities challenge them not only mentally but also physically in a manner that other science experiences may not (SCORE, 2009b).

There are currently no serious threats to practical biology from health and safety requirements, but the situation needs to be kept under review (Ackon, 2014). Locally, in some secondary schools, pupils' behavior and a lack of technical expertise may result in significant reductions in practical science. Biology has had its share of setbacks especially arising from attitude, resources, administrative challenges, pedagogical challenges (Imanda, Okwara, Murundu and Bantu, 2014; Ngakhala, Toili and Tsingalia, 2017). Ongowo and Indoshi, (2013) observe that the current assessment demands are damaging practical science. They further posit that the Kenya National Examination Council (KNEC) gives minimum emphasis on biology practical testing specifically manipulative activities that require use of integrated science process skills. Since the ideas are not available to make sense of, the activity or observation made must reduce the effectiveness of the practical activity as a learning event. There is a mismatch between what teachers identify as their outcomes before lessons and the outcomes that their students perceive. Such a challenge is propagated due to the nature of testing adopted by KNEC.

2.2 Benefits of Using Practical Work in Biology Teaching and Learning

Practical work can motivate learners by stimulating interest and enjoyment, be used to teach laboratory skills, enhance the learning of scientific knowledge, give insights in to the scientific method and develop expertise in using it and, develop scientific attitudes such as open mindedness and objectivity (Hodson, 1990; Imanda et al, 2020b). Well planned practical work can stimulate and engage students' learning at different levels, challenging them mentally and physically in ways that other science

experiences cannot (SCORE, 2009a). The findings of this study conform to those by Daba et al. (2016) which revealed that most of the learners under study reported that the practical activities they had been exposed to made them develop more interest to learn. However, these findings are in contrast to those by Negassa (2014) who found out that the learners under study were not interested in conducting practical activities.

Chala (2019) posits that biology practical activities have an ability to provide a good opportunity for students to apply their newly acquired knowledge and skills. As a result, learners are able to gain first-hand experience and interaction with the phenomena. Teaching science with a sole purpose of understanding is founded in the conceptual change theory. Biology being a science subject too needs to conform to this. Achimugu (2014) observes that effective science learning encompasses experimentation that involves hands-on and minds-on activities so that the learners can have a better understanding of the concepts and skills. This is because experimental methods enable students to verify theories, laws and principles surrounding science phenomena. Kulshretta (2013) from a study in India observes that some advantages of practical activities in science teaching include; skills development, planning, manipulation of equipment, observation, analyzing, evaluating, experiential learning, testing out own ideas, testing out theories, developing of problem solving strategies and team work. Other importance as per Achimugu (2014) are: taking learning responsibility, nurturing self-learning, students work at their own pace and level, supporting differentiation by outcome, task and questioning. It is evident that the benefits are varied from various authors.

From their study, Imanda, Omwenga, Andima and Obuba (2020b) found out that when practical work is planned and administered appropriately, it contributes positively to the learner attainment. Learners are expected to have a better performance when they undergo instruction via practical approaches that encompass process skills. This position is further supported by various other studies (Ndioho, 2007; Ekon & Eni, 2015; Ongowo and Indoshi, 2013). This benefit goes a long way in assisting learners beyond school life since biology as a subject deal directly with the learners' life, health and surrounding. Sadhana (2017) is of a similar standpoint that practical learning needs to be encouraged and practiced while rote learning should be discouraged. When learners are engaged in practical learning the outcomes from the process are more permanent, meaningful and concrete.

Ackon (2014) observes that science practical has a significant contribution to learner academic attainment. Learners taught through well planned practical approach have been observed to have higher academic attainment than those taught via the expository approaches. Similar observations have been posited from a study by Gituthu (2014) who observes that, student-centered teaching approaches have a contribution towards learner achievement in KCSE biology examination. The study also found out that the declining pattern in learner performance in biology was in part an attribute of the negative attitude of teachers towards the learner-centered instructional approaches. Practical work is a learners centered instructional approach which is powerful as part of heuristic teaching approach. Ngakhala, Toili and Tsingalia (2017) reiterate that the poor attainment by learners in biology practical examination, might be as a result of poor teaching methodologies and inadequate exposure of learners to the prescribed practical knowledge that is expected to mould them in the scientific way of life. The present study sought to find out if equally the biology teachers in Gucha South sub-county perceived such benefit accruing from practical work.

It is therefore evident from these studies that practical work if well implemented should impact on leaner attainment. Practical work therefore has been found to be more effective in improving and enhancing appropriate learning especially when well planned in secondary biology. There is a need for a teacher to adequately plan for the various activities for there to be an increased level of value from the practical activities.

3. Methodology

The study adopted survey and historical research designs. The great advantage of survey design is that you can gather a great amount of data in a short period of time. Time limitation therefore guided the choice of this design. Kanwarjit (2012) underscores the fact that historical research design leads to unveiling of a wealth of data and information already existing in literature which can be very useful in any given study.

The area of study was Gucha south sub-county which is one of the eleven sub-counties in Kisii County. The target population was 42 biology teachers in public secondary schools in Gucha south sub-county. The sample was selected using saturated sampling technique. As Kanwarjit (2012) observes, this technique is appropriate when the target population is small and therefore all biology teachers in the sub-County took part in the study. The technique is less cumbersome as it eliminates the need for assigning numbers to the names of schools as simple random sampling does. Table 1 presents the sample size that was used for this study.

Table 1: Sample Size

Gender	Total teachers	Biology	Sample selected	% Sample selected
Female	11		11	100
Male	31		31	100
Total	**42**		**42**	**100**

Source: Researchers' design

From Table 1 it is evident that all the biology teachers in the sub County took part in the study. Such a sample was reasonable for collection of data for the study (Emaikwu, 2013). Data for this study was collected by use of the Biology Teachers' Questionnaire (BTQ), Biology Teachers' Interview Schedule (BTIS) and document analysis guide (DAG). The interview schedule was a follow up on the BTQ for purposes of triangulation. The questionnaires were administered by the researcher to the respondents in the various schools. The researcher did self-introduction orally and also through a letter to the school principals. The teachers were assured of the anonymity in reporting of the results. DAG was used continually before and during the study to review relevant literature to anchor the study. BTQ were collected back from the respondents after three days. They were then analysed to arrive at percentages and emerging themes. After two weeks a follow-up BTIS was administered to five of the biology teachers, this was to dig deeper in the teacher responses in the BTQ and seek clarifications for purposes of ensuring validity.

Validity is the extent to which the empirical measure or several measures of concepts accurately measure the concept under study (Emaikwu, 2013). The questionnaires were constructed in close consultation with Kisii university research experts. Reliability of the questionnaire was determined during piloting. After piloting appropriate item modifications and adjustments were done. The instruments were administered twice at an interval of two weeks to a sample of five biology teachers. The schools that took part in the pilot study were hence excluded from the actual study. During the main study, after instrument administration, a 100% response rate was obtained from the BTQ. This response rate was very good (Emaikwu, 2013)**.** The data collected from this study was mainly qualitative hence the analysis was basically through content analysis. Open-ended question items yielded responses that were organized, categorized and reported in line with the objectives of study and emergent themes. Percentages and verbatim were forms in which the data was presented. During data collection and analysis stage, the researcher strictly adhered to ethical requirements in research.

4. Results and Discussion

This section presents the study findings and the discussion. The findings are presented in two sub-sections as per the study objectives: Challenges in the use of practical work in biology instruction and benefits of using practical work during biology instruction.

4.1 Challenges in the use of Practical Work in Biology Instruction

The results from the analysis on the challenges that biology teachers face when using the practical work are presented in this sub-section. The open-ended question items after analysis revealed various challenges as perceived by biology teachers. Table 2 presents a summary of the challenges.

Table 2: Challenges Faced by Teachers when Using Biology Practical Work

Challenge	N(42)	%
Inadequate instructional resources	32	76
Teacher inefficiency and inexperience	20	48
Learner and teacher safety and health	16	38
Absence of technical assistant /laboratory technician	29	69
Time factor	26	62
National examination and assessment format	19	45

From the results in Table 2, it is observed that the most identified challenge was inadequate instructional resources at 76%. However, 38% was the least proportion of teachers that identified safety and health of the teacher and learner as a challenge.

Of all the biology teachers under study, 76% of them reported that inadequate resources and facilities were a great challenge when using biology practical work during biology instruction. A teacher cited a case whereby the school administration is not able to provide the requirements for a practical on time. The teacher mentioned:

> *You organize for a practical and in advance write down the materials and requirements you need for the practical, but the last minute you are disappointed just because the materials are*

not purchased. Sometimes it's because the school principal does not want to spend money on the purchases of such material. In the long run the practical is not carried out especially if it is material that can't be improvised (Ms. Abby. 16th June, 2019).

From this verbatim it is implied that resource and facility inadequacy can be a great hindrance to use of practical work. Their timely availability is key in ensuring that the practical work is conducted as scheduled. Similar findings were reported from a study by Imanda et al (2014). Ekon and Eni (2015) observes from their study that for effective administration of practical activities, adequate provision of instructional material is necessary. However, CEMASTEA, (2009) observes that as much as resources may never be adequate, it is the sole responsibility of science teachers to be more creative and embrace improvisation. This is expected to address the challenge of inadequate resources. Nwosu (2006) observes that learners need to be part of the improvisation process of science materials, pointing out that improvisation by students may explose them to specific knowledge and skills required during learning. The findings of the present study are in conformity with those by Chala (2019) that science laboratory should be well equipped so as to carry out meaningful demonstrations and experiments.

Teachers' inexperience and inefficiency were also reported by 48% of the biology teachers under study as a hindrance to effective use of practical work. The training a teacher underwent at undergraduate or diploma level determines his ability to use the practical teaching method. Understanding of the psychological foundations and pedagogical principles will too affect the teachers' use of practical work in biology classroom. If one was well founded in these principles at training, he or she is likely to frequently use practical work effectively as his method of choice in teaching of biology. Samikwo (2013) posits that adequate experience is a precursor for proper pedagogical implementation of practical work in biology. Similar claims have been raised by Ngesu et al. (2014) that the poor science learning by students might point towards the teachers' fault in the area of competences. This calls for regular in-service biology teacher trainings and sensitization programmes. A study by Mwangi and Orodho (2014) shows that teacher in-service training can greatly enhance teachers' capacity in classroom instruction and management. Similar observations have been made from a study in England by Sharpe (2012).

Health and safety of both the learner and the teacher is an important consideration in the design of a biology practical. Out of the biology teachers under study, 38% of them cited this as a challenge. Some practicals could be having the moral implications especially ones dealing with the manipulation of chromosomes, genes or deoxyribonucleic acid (DNA). Some other practicals could be dangerous and require special conditions such as those dealing with pathogens. Due to the involvement associated with biology practicals coupled with inexperience, some teachers feel intimidated to carry out such practicals. If precautions are not put in place, such practicals can cause serious injury not only to the leaner but also to the teacher. As a result of this therefore, most teachers will tend to shy off from such practicals. There could be need for precaution when dealing with some specimens. This is so as not to spread diseases such as HIV/AIDS, Tuberculosis, Corona (Covid-19), among others. For example, with the present global outbreak of Covid-19 pandemic, heath protocols have been put in place not only in Kenya but across the globe and it is paramount for everyone to adhere to them. For some practical activities, it appears relatively impossible for them to be carried out due to fear and caution of transmitting Covid-19 (Areba, 2020). By adhering to such heath protocols and precautions it is ultimate that the overall biology instructional targets may not be wholly met. Therefore, there is need for such practicals to be carried out in shifts or individually so as to minimize interpersonal contact and sharing of apparatus; hence maintain social and physical distance. These findings are in contrast from those from a study by Ackon, (2014) whose study observed that no serious health challenges have been reported from practical activities. However, the study was conducted in Ghana unlike the present study which was conducted in Kenya.

In the preparation of a practical activity, due to the overwhelming content to be taught, the biology teacher needs to be assisted by a laboratory technician or assistant. In cases where the laboratory technician or assistant is not available, it becomes a great hindrance to the use of practical work. This challenge was cited by 69% of the respondents. The challenge becomes magnified especially in cases where such a practical activity requires to be monitored by the technician in line with the various parameters in place. This challenge is school administration-related and requires that the school administration or the school principal for that matter, as much as possible recruits a laboratory technician. In circumstances whereby it is impossible to recruit a laboratory technician, then team teaching can be used whereby during a practical the various biology teachers work together in lesson preparation to ensure the lesson is a success. Ameka and Nyakwara (2020) suggest lesson study as the solution to this challenge. Biology teachers need to be cognizant of the fact that learners with limited strength and mobility have an ability to benefit more from laboratory activities especially when there is a laboratory technician (Tenaw, 2015).

Generally speaking, practical work requires a relatively extra time in the planning and administration of the same. Of the teachers under study, 62% of them reported time as a challenge in the use of practical work in teaching of biology due to the pressure of completing the syllabus and many other interferences in the school term such as sports, drama and music. Teachers tend to feel that, the time

available is not sufficient for consistent use of practical work in teaching of biology. Yandila and Komane (2004) from a study in Botswana revealed time as an important factor that need to be considered when planning for and administering a biology practical lesson. These findings are further in conformity with those from a study by Ackon (2014) carried out in Ghana which showed that time was a challenge. Therefore, planning for biology practical activities in advance and trying them out before the main classroom lesson is an important precursor for good lesson time management.

Examination and assessment also were reported as a challenge. Out of the total study population, 45% of the biology teachers reported that the less emphasis given to practicals in assessment and in examinations especially national examinations also makes them not to be persuaded to use the practical teaching method and approaches. Since assessment has a great bearing on the destiny of the learner, teachers therefore tend to teach in line with how the assessment is going to be conducted. This is common especially when a given testing trend is found to be predominant with the national testing body, KNEC. Ongowo and Indoshi (2013) came out with findings that show inconsistent testing of practical concepts by the KNEC for the period 2002-2013. However, their study revealed a biased testing on the basic science process skills. Their study recommended a blended balance by the KNEC during the test development and assessment especially for biology in secondary schools. Practical work and the associated activities are a great ingredient during the teaching of biology. Similar findings have been obtained from a study in Ethiopia by Beyessa, (2014).

These challenges are important in determining the extend of biology practical work implementation. Biology teachers have been observed to make common errors of some practical activities during instruction. The challenges that the biology teachers experience during biology practical instructional process might be viewed as the cause of such omission errors (Ndioho, 2007).

4.2 Benefits of Using Practical Work during Biology Instruction

The second objective was to determine the benefits of using practical work during biology instruction. The benefits have been analysed and presented in this sub-section. Practical work as envisaged in the literature has a myriad of challenges, equally there are benefits of using practical activities in the biology classroom. The most often referred to benefits are expected to reflect other anecdotal evidence. Biology teachers under study revealed that well planned practical activities, motivate and engage learners' learning at varied levels. This ends up challenging and provoking their thinking in ways that other science experiences may not. Biology practical activities lead the students to develop a bridge between what they can observe and handle (hands-on) and scientific knowledge (brains-on). This creates a link between biological knowledge and the real world. These findings corroborate those by Hunde and Tegegne (2010) who reported that, although science laboratories have a myriad of benefits ranging from making learning concrete to setting up a foundation for science education; learners were found to be deprived of these opportunities due to inadequate exposure to practicals.

The respondents recognize that when the practical work is of good quality the students can be engaged more. It can also make them develop the necessary skills, and enable them to have an understanding of scientific investigation process leading to better understanding of new concepts. Another merit of experiencing biology practical work, is that it leads to the acquisition of an understanding of hazard and risk in the working environment. Safe working minimizes infection and transmission of some communicable and contagious infections. Since the nature of biology as a subject encompasses living organisms, precaution is paramount. This, if not mitigated may result in to a pandemic like the case of Covid-19 which has greatly impacted negatively on the education sector (Areba, 2020).

The biology teachers under study further revealed that practicals tend to put biology into context. It makes the subject to take its place as a natural science. This brings about an element of creativity. The learners become more creative and hence can become problem solvers in the mainstream field of science. Creativity is key in solving some of the pertinent issues and problems that emerge in our day to day life both locally and internationally. Such could include issues pertaining pollution, human diseases, HIV/AIDS and terrorism. This concurs with the sentiments by Ameka and Nyakwara (2020) who opines that no course in science including biology shall ever be complete without including a practical component. The practical activities need to be conducted by individuals either in science laboratories or in classes. At school level, practical work is even more important because of the fact that we learn by doing. Scientific practices and applications are thus rendered more meaningful. There is sufficient evidence that when learners observe a material and handle it, then there will be concrete and active learning unlike if they just hear about it or see it from far away.

The biology teachers further reported that practical work motivates learners in learning more of the biological knowledge. Learners who are motivated are likely to gain more from the entire process of learning. The motivated learners enjoy the entire learning process; this makes the learners benefit more from the process and understand investigation processes. This is in agreement with the findings from a study in England by Sharpe (2012) that practical work influences learner attitude towards biology.

Biology teachers in the present study reported that most of the practicals done were those in which students were expected to make scientific investigations on the parameters at hand. Practicals also encourage enquiry amongst learners in the whole process of learning. One teacher contented from the interview that:

> *After continued use of practical activities in my biology classes, I have observed learners being more innovative and in fact thinking like scientists. It is just last year when two of my form three students came up with a biology project that they presented in the science and engineering fair. They did so well and went through the zonals, sub County, county up to the regional level. They narrowly lost to proceed to the national level since they scooped position three. Unfortunately, only position one and two usually proceed to the national level of competitions. This performance has greatly motivated them and I attribute that to my continued exposure of learners to more practical activities (Mr. Andrew, 12th June, 2019).*

From the verbatim, it is evident that practical activities have a great influence on learners' development of important biology skills and hence the application of such skills. As Gituthu (2014) contents, new concepts are taught and introduced which ultimately make the learning process to be inquiry-oriented. Science and for that matter biology is a practical subject in which learners need to view the real world through it. Practical activities being real, provide an opportunity to link the practical aspects to the theory. This makes the learners have confidence in some of the theoretical content and aspects that they go through during learning while in school. In so doing the learners are able to appreciate that biology as a science works (KIE, 2006).

Since practicals can be carried out at group level involving a few learners (about five) in each groups; this encourages development of group attributes such as communication, collaboration and cooperation. It also tends to address the affective domain of knowledge as per Bloom's taxonomy of objectives. Another benefit from the study findings was that, practical activities promote understanding of biological concepts and principles. A practical activity is carried out by learners individually or in groups. Each learner or group of learners perform an identical experiment at the same time. Learners can also perform different experiments in turns to give everyone a chance to perform all the experiments. This approach is commonly used when resources or equipment are not sufficient. This approach is advocated for by various scholars (CEMASTEA, 2009; Imanda, et al, 2014). However, Etiubon and Udoh (2017) obtained contrasting findings whereby learners taught through practical activities and those through practical manuals did not show a significant difference is attainment.

There is evidence that experience of carrying out extended practical projects can provide students with insights into scientific practice and can increase interest in science and motivation to continue its study (Woodley, 2009). Examples of the successful use of extended projects are, however, mainly at upper secondary school level and beyond, where students are to some extent self-selected, teachers have better subject knowledge in general, and group sizes are smaller. KIE, (2002) presents the methodologies, approaches and learning activities recommended for biology instruction. The emphasis is more on hands on activities due to the aforementioned benefits.

5. Conclusion and Recommendations

The conclusions emanating from the study findings are presented in this section. Furthermore, the recommendations are suggested in line with the study objectives.

5.1 Conclusion

The challenges identified by the biology teachers in the implementation of practical work among others include; inadequacy of instructional resources, inexperienced biology teachers, health and safety concerns in some experiments, overwhelming syllabus content, time limitation and the mode of testing in examination with less emphasis on practical activities. These challenges provide a platform for their mitigation so that the benefits can accrue from the practical activities. Equally, biology teachers on coming to terms with these challenges, it will be an avenue for them to work out ways to counter them so as to reinforce the benefits arising from using practical work. This ultimately will increase the use of practical work in biology teaching. Despite the challenges, the study also revealed several benefits; provides a link between the theory and real world, promote better understanding of biological concepts and principles, puts biology into context, motivates learners to learn more, provides a link between practical work and theory, develops interpersonal skills among learners. These benefits that were elicited in the findings of this study can be a motivator to biology teachers on the need to use practical work in teaching.

5.2 Recommendation

There is every reason why the education stakeholders need to understand the aforementioned challenges that biology teachers face while using practical work in teaching. The quality assurance and standards officers should take time to supervise and guide biology teachers on the use of practical work in teaching frequently. More in-service

training and seminars to be organized, to sensitize the biology teachers on the benefits of using practical work, challenges and mitigation measures in biology teaching and hence the need to use it. The school principals should strive to facilitate provision of the necessary instructional resources in schools so that a greater spectrum of the benefits of using practical work can be achieved.

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